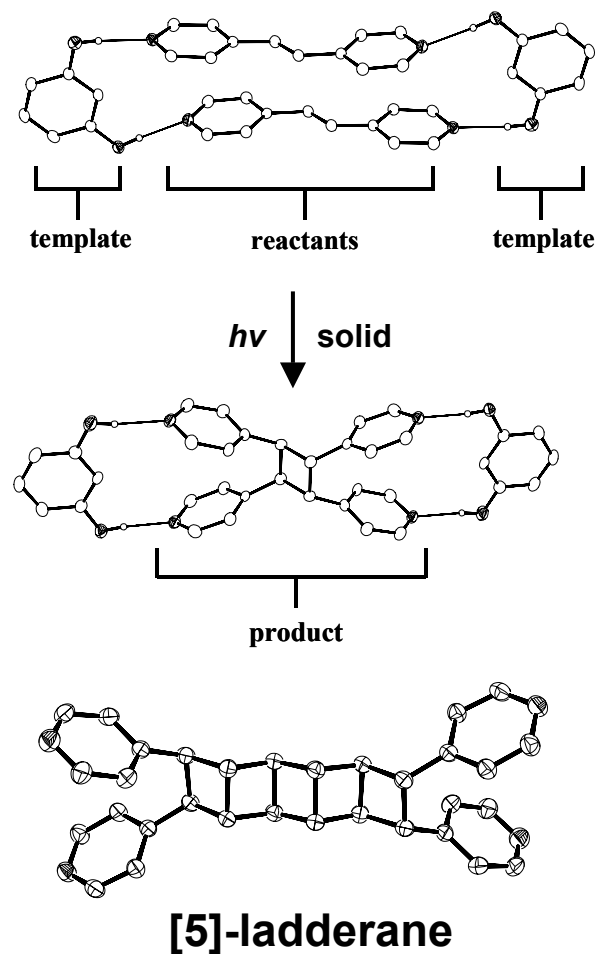


Template-Controlled Solid-State Synthesis of Covalent Bonds in the Solid State

Leonard R. MacGillivray, University of Iowa, DMR-0133138

Scientific Merit: A general ability to direct the formation of covalent bonds in molecular crystals bears relevance in areas ranging from chemical synthesis (*e.g.* green chemistry) to materials science (*e.g.* optical switches). We are developing such a method (top right) that uses molecules, as linear templates, that preorganize olefins in the for [2+2] photodimerization. We have recently used our method to form molecular ladders (bottom right), challenging targets in conventional synthesis and molecules recently identified in anaerobic bacteria that participate in the oceanic nitrogen cycle, in 100% yield and gram quantities (*Angew. Chem. Int. Ed.* **2004**, 43, 232).



Template-Controlled Solid-State Synthesis of Molecular Ladders

Leonard R. MacGillivray, University of Iowa, DMR-0133138

Immediate Relevance, Education and

Outreach: We have now transferred our ideas to the field of inorganic chemistry by using inorganic templates, or ‘metallotemplates’, to direct reactivity in the solid state (*J. Am. Chem. Soc.* **2004**, *126*, 9158). The metal-based templates are based on dinuclear Zn Schiff-base complexes. Seven undergraduate and nine graduate students, as well as two postdoctoral fellows contributed to the work. A sophomore lab in organic chemistry has also been introduced approximately 300 undergraduates to the template-based solid-state approach involving the organic templates.

